Before the
Federal Communications Commission

In the Matter of
Restoring Internet Freedom
Proceeding 17-108

Comments of Andrew Norton, Lead Researcher, TorrentFreak.com

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Personal Background

I am Andrew “K`Tetch” Norton and I have been working in the digital field for over 30 years. I have been the lead researcher for Torrentfreak.com - a Netherlands-based news site which focuses on p2p and streaming news - since April 2007. This has resulted in me consulting with lawyers working on ‘copyright troll’ cases nationwide, and acting as an expert in the networking and p2p field, including as an expert witness in court. Prior to this, I have worked in numerous technical fields, including as a technical/safety advisor and inspector on the Comedy Central show “BattleBots” for 3 seasons (as well as the initial genesis for what became Mythbusters) and between 2001 and 2015 I worked in my spare time on the Muon1 Distributed Particle Accelerator Design (Muon1 DPAD) project based out of the Rutherford Appleton Laboratory (RAL) just outside Oxford in the UK, working on design, testing, and some infrastructure tweaking of a Muon-based particle accelerator.

Finally, between 2011 and 2015 I worked on the Electronic Frontiers Forums lecture series, both as a moderator and speaker, and as the technical producer. This covered a number of technical and law topics, including a number specifically dedicated to the topic of Net Neutrality.

Needless to say, I’ve had a wide range of experiences in the technological field, especially when it comes to the subject of net neutrality. Indeed I made one of the first contributions to this current ‘fight’ ten years ago. Thus follows my comments on the subject of proceeding 17-108 “Restoring Internet Freedom”.

I also enjoy drinking from oversized mugs, although being civilized, I prefer tea

Background to the current debate

To adequately contextualise the comments and positions, it's necessary to recap some of the historical facts in the greater net neutrality debate, especially as many have been overlooked and ignored to push a personal agenda by FCC Chairman Ajit Pai.

Comcast, Sandvine, and Bittorrent

In 2007, only a few months after I was retained by TorrentFreak.com to be their lead researcher, I was asked by the Editor-in-chief to look into reports concerning issues with the use of the Bittorrent protocol with Comcast networks. After examination (using a network of friends, friends of friends, acquaintances, and people who responded to an open call online) we found that Comcast was using 'something' to perform a man-in-the-middle attack on bittorrent users who were seeding, and sending forged RST packets to either side of the connection, purporting to be from the other side, to terminate the connection, and making seeding impossible. After doing this research for a two-week period across the country, and finding consistent reports, we at TorrentFreak published our findings on August 17 2007 in a piece called "Comcast Throttles BitTorrent Traffic, Seeding Impossible"[1].

Following this report, we got comments from hundreds more all over the US who had similar problems. Comcast, in response said "We're not blocking access to any application, and we don't throttle any traffic". While technically true, it avoided the actual issues raised. The bittorrent protocol is not an application, and terminating traffic entirely is not throttling (which would imply slowing the rate). A few months later, an internal memo that was leaked to the Consumerist[2] emphasised that this was to be the company line and that the technology being used (by a company called Sandvine) was not to be mentioned, and anyone doing so, or leaking the memo would be terminated.

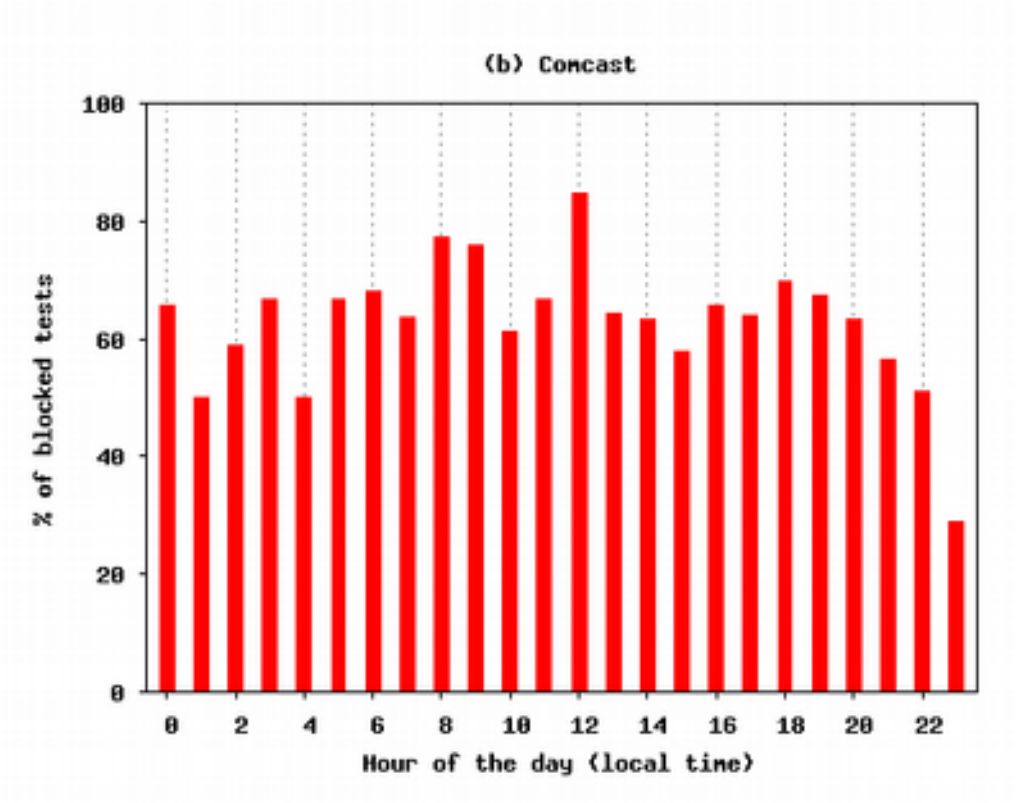
In the meantime, both the Electronic Frontier Foundation[3] - one of the premier technology-focused rights groups - and the Associated Press[4] had done their own studies, and corroborated my testing. In addition, complaints had been filed with the FCC, leading to hearings.

In submissions to the FCC, Comcast claimed they were only doing this throttling at peak times

1 https://torrentfreak.com/comcast-throttles-bittorrent-traffic-seeding-impossible/
2 https://consumerist.com/2007/10/26/comcasts-we-dont-throttle-bittorrent-internal-talking-points-memo/
3 https://www.eff.org/deeplinks/2007/10/eff-tests-agree-ap-comcast-forging-packets-to-interfere
4 https://web.archive.org/web/20071021020905/http://ap.google.com/article/ALeqM5gxRiQSVfgK4sLbVRE_X4MOlM9q0AD8SCASPG0 - A link to the Internet Archive is required because the original link no longer exists

> “Comcast’s network management practices (1) only affect the protocols that have a demonstrated history of generating excessive burdens on the network; (2) only manage those protocols during periods of heavy network traffic,”

However, data from the Max Planck Institute (MPI) - A German research institute with over 33 Nobel prizes to their credit - and their Glasnost tool designed to check specifically for this type of Man-in-the-Middle attack published results in August 2008[5] that showed that Comcast was



using it at all times of all days, as shown in the graph below.

This sort of test result is not consistent with the claims made to the Commission and further undermined the reliability of Comcast’s claims. In addition, during the first public hearing on the topic, held at Harvard, Comcast hired Seat-warmers to substantially reduce public participation.

Regardless, In August 2008 the FCC issued a ruling[6] on the matter that essentially covered all the ground above, especially that Comcast constantly lied on their network management practices, and each time only came clean after evidence was revealed showing that they’d lied. We released evidence, they denied. The EFF and AP corroborate our claims, they denied emphatically. The FCC held hearings, they admitted they’d lied, and did do it, but only when absolutely necessary. The MPI showed they did it all the time, and they admitted, yes, they lied again.

5http://broadband.mpi-sws.org/transparency/results/20080725/index.html
6https://apps.fcc.gov/edocs_public/attachmatch/DOC-284286A1.pdf

This habitual lack of honesty is why Comcast is consistently viewed as one of the worst companies in America by customers[7]. Companies with a strong anti-consumer ethos require strong regulatory oversight by consumer-focused regulatory agencies (such as the FCC) to prevent, and punish bad corporate behaviour.

Comcast appealed this FCC order, and it was overturned by the courts in Comcast v FCC. In response, the FCC codified the Open Internet Order, which was based on the 4 principles of the open internet as drafted by the Republican-led FCC in 2004/2005.

Those 4 principles are

- Consumers deserve access to the lawful Internet content of their choice.
- Consumers should be allowed to run applications and use services of their choice, subject to the needs of law enforcement.
- Consumers should be able to connect their choice of legal devices that do not harm the network.
- Consumers deserve to choose their network providers, application and service providers, and content providers of choice.

Comcast's actions violated the first, second and fourth principles in this list, as Comcast blocked and restricted people's access to content providers of their choice using the bittorrent protocol for any service they desired, be it upgrading World of Warcraft clients, distributing their own videos (as I have done with the Electronic Frontier Forums videos utilizing The Pirate Bay) or copies of the Bible (as in the Associated Press tests mentioned above).

Verizon appealed this, and in 2014, the courts again threw it out, stating that as they were classified under Title I, these ideals could not be applied, as they could if it were classified under Title II, which did give the appropriate authority.

Thus in 2015, after extensive public comment, the FCC voted to reclassify ISP's from Title I to Title II. My comment to that proceeding is attached here to be reconsidered as Attachment A below.

For a more extensive overview, with more source links, you're welcome to read an extended piece at my website[8] or watch a video version[9] of me explain in plain language and terms, including responding to some of the more vocal opposing comments (as well as the identity-theft based cut-and-paste comment)

7 http://www.pcmag.com/news/350979/comcast-is-americas-most-hated-company
8 http://ktetch.co.uk/2017/07/net-neutrality-history/
9 https://www.youtube.com/watch?v=ch0v8zkQAfQ

Reclassification

To hear many (including FCC chairman Ajit Pai) talk, it would sound as if this 2015 reclassification was the first and only time in which it had been done. In fact, it's the second time classifications had been changed for ISPs.

Prior to 2005, DSL and other telephone-based systems were classified under Title II, while Cable-based internet systems were classified under Title I.

This is because both were not classified as 'internet providers' in their own right, instead they were classified based on their preceding infrastructure - cable TV or telephone.

So in response, the apply 'harmonisation' in 2005 all ISPs that were previously under Title II were now classified under Title I. This loosening of regulations was supposed to provide a 'light touch', and foster and encourage investment, and innovation.

It failed.

SPECTACULARLY.

As noted in my 2015 comment, from 2006-2014, the DSL service I had with AT&T was utterly stagnant. Upgrades were promised to U-verse fiber in 2007, and in 2008 I was assured the fiber was in the local office. By 2010 the upgrade project had been cancelled. Was it just a coincidence that following its partial deregulation, AT&T ceased and reduced rollouts across much of the nation. In fact in recent years it has looked to abandon DSL altogether, pushing for far more expensive, less reliable, less practical, but more profitable wireless connections instead.

It's also no surprise that following the reclassification, DSL speeds nationwide stopped progressing, while DSL speeds in other countries carried on growing.

The net result was that the blanket reclassification to Title I didn't improve things, they actively encouraged a stagnation. Thus it's bizarre to expect that again pushing things back to Title I would 'improve' things in any way.

Indeed, it's been shown worldwide that deregulation (or its kissing cousin 'light touch') never leads to a better, more cost effective product .It leads towards price fixing, collusion, localised monopolies, no-compete agreements, price inflation and product stagnation.

Those that opposed the classification and the imposition of regulations claim such regulations are unnecessary, yet if companies can show regulations are unnecessary, or without a sound legal footing, they can challenge them in court, while ISP's have done 3 times now, in Comcast v FCC ,Verizon v FCC, and US Telecom Assn. v FCC. In the first two, courts found the FCC had over-reached, in the 3rd they ruled for the FCC.

Others have claimed that this reclassification to Title II has, or is going to reduce infrastructure investments. That includes public comments by major ISPs[10]. However, when speaking in forums where they're legally required to be accurate in their statements, they have admitted that there would be no impact[11], and so such public statements should be disregarded as more lies (which, as comcast showed above, is fairly typical). Indeed their legal financial filings underscore that claims of investment harm is a complete fabrication[12] designed to mislead easily swayed people lacking in critical thinking who is completely incapable of believing that any major business representative would deceive people for personal gain.

It should be remembered, that regulations exist because companies have already been found to have acted improperly. These regulations, including the Title II reclassification and the imposition of Net Neutrality are not random wishes, but are based on a real pattern of harm and misbehaviour by ISPs, some in the US, some elsewhere. This is because laws do not allow regulations to be imposed that are arbitrary or capricious.

Chairman Pai claims to want to bring back a thriving digital economy

> "We are confident in the decades-long, cross-party consensus on light-touch Internet regulation — one that helped America's digital economy thrive," Pai said. "Our approach will be not zero regulation, but light-touch regulation — rules backed by long-standing principles of competition law."[13]

The problem is that the very thriving he wants to happen took place when the majority of US network access was using Title II regulated connections. And it is only through the imposition of Net Neutrality that new products can have the access to grow without interference from ISPs.

Other violations of Net Neutrality

This is by no means a full list, but it includes a non-exhaustive list of network neutrality violations that other ISPs have performed in the past that have influenced regulations, or shown a need for Net Neutrality.

The following is a list from Free Press[14] (although they do have an error listing comcast as starting their Sandvine use in 2005, rather than 2007 as noted above)

- Madison River (NC) blocking VOIP service Vonage in 2005

10 https://www.techdirt.com/blog/netneutrality/articles/20150122/06461429776/verizon-doubles-down-bogus-claim-title-ii-will-kill-broadband-investment.shtml
11 https://www.techdirt.com/blog/netneutrality/articles/20141211/05462229389/verizon-admits-to-investors-that-title-ii-wont-harm-broadband-investment-all.shtml
12 https://consumerist.com/2016/02/09/did-net-neutrality-kill-broadband-investment-like-comcast-att-verizon-said-it-would/
13 http://www.reuters.com/article/us-usa-fcc-idUSKBN16720Z
14 https://www.freepress.net/blog/2017/04/25/net-neutrality-violations-brief-history

- Telus (Canadian) blocked access to a service hosting a website supporting a Telus employee strike in 2005
- AT&T used their exclusivity deal with Apple to block the use of Skype on initial versions of the iPhone from 2007-2009
- Windstream used packet hijacking to redirect people's search queries from the service of their choice to one chosen by Windstream
- Similarly some small ISP's did similar actions to redirect searches to profit from referral fees in 2011.
- In 2013, AT&T, Verizon and Sprint colluded to kill competition from Google Wallet, a push customers to 'ISIS', a mobile payment service in which they had a financial stake.
- In 2012, Verizon blocked the ability of customers to use bandwidth they had purchased for tethering without paying extra fees, despite it being a violation of a 2008 agreement with the FCC. This practice continued and I have personal experience of Verizon pushing a required system update to a Samsung Galaxy S3 in January 2014 to prevent tethering to my Samsung Galaxy Tab 3 7.0, despite being on a fixed data plan.
- Zero-rating. A practice that benefits some data sources by not counting them against data capacity limits ("data caps"). Almost all caps on fixed wireline services are based not on engineering necessity but on business decisions to extract additional money from consumers. (see later)

As you can see, the common theme running through this is that consumer freedoms were restricted/reduced/removed for a profit motive. Either to directly make them money (through affiliate fees or forcing the purchase of a more expensive product) or to directly benefit a service or product with which they have a financial connection.

Title II classification is, according to the courts, the only way short of Congressional action (which at present is impossible due to the dysfunctional nature of that branch of Government) to protect consumers from these anti-consumer, and anti-competitive actions.

To attempt to claim these violations haven't existed, or that absent regulations, that companies will suddenly act completely differently is to show an incredibly naive outlook, or hides to a darker (and possibly illegal) motivation, and does not meet the standards of reason that FCC commissioners are supposed to employ.

Personal Observations

Competition

As noted elsewhere and in previous submissions (Appendix A) residential internet services are increasingly falling behind those in other countries, and this apparently started approximately 10-22 years ago, following the relaxing of regulations under Title I. While Cable Internet had always been under that, it had to compete with Title II telephone-based services who had to keep innovating. Now, they don't and DSL no-longer keeps pace.

I checked my old home in the UK, which had zero broadband available as recently as 2003. That same area now has DSL from multiple providers, the same for fiber, AND cable options. Five providers offering 70+Mbit connections over fiber, and their prices are in the £25-£35 ($32-$45[15]) range with zero caps, a similar number offering 17 Mbit DSL for less, and a 200Mbit+ cable offering for $45. None include data caps. Compare to my last house, in Georgia, where AT&T still provides the exact same DSL service as 2006, and still charges $60/month for 6 Mbit down. Why? Because they're the only provider. Comcast is the franchise holder in the area, but they don't seem to want to provide service.

Ideally Local loop unbundling would solve significant issues with competition, investment, etc. but it would seem that we do not have the correct…. 'Political will' to push forward this sort of forward looking

In fact, ISP's worldwide are leaving the US in the dust as a result of profit-focused policies such as the 2005 Title I reclassification. When innovation has happened, when product expansion has taken place, it's rarely due to a sudden display of largesse by ISPs, it's been in response to disruptive market forces.

A prime example has been Google Fiber. Prior to its rollout, 50 and 80Mbit packages were considered 'the best' in the US. Suddenly, in a fit of activity, following announcements by google Fiber in areas, then and only then did the major incumbents (mainly AT&T and Comcast) suddenly announce their ability to provide such services. They'd had the ability to provide the services, who knew (well, apart from the ISPs themselves)?

In addition, the costs for such gigabit systems are 'competitive', at about $70 (plus fees) for a gigabit service in Marietta GA, which is odd, considering that as noted above, 6Mbit service is $60. But if data usage is such a big deal (to require caps) why the $10 price difference for a service that is more than 150x faster? It just underscores that data caps are again profiteering at the expense of the customer and that network infrastructure is deliberately run as slowly as possible due to lack of competition, with customers gouged as a result.

Competition MUST be increased, and that includes the adoption of 'one-touch-make-ready'. At present, incumbent providers often deliberately attempt to disrupt the rollout of competing service, by 'going slow' on pole access. In other instances, companies will take more direct methods to reduce competition, as with Telecom Cable LLC in Texas, who allegedly had ALL their cables cut by Comcast[16] when Comcast was installing its own cables, disrupting all customers, which it then took.

15Approximately, As of 17 August 2017 exchange rate of 1 USD = 0.765 GBP

16https://arstechnica.com/tech-policy/2017/06/lawsuit-comcast-sabotaged-small-isps-network-then-took-its-customers/

Rolling back from Title II to Title I will do nothing to address any of these roadblocks, most of which are put in place by the incumbents themselves, to protect their natural monopolies and prevent a competitive market.

“Light Touch Regulation”

This particular buzzword by FCC Chairman Pai sparked recollection from the excellent discworld series written by the recently departed Sir Terry Pratchett. It is a series that often satirizes life, and in The Truth[17] he focuses on Government, crime and Journalism.

> And these are your reasons, my lord?'
> 'Do you think I have others?' said Lord Vetinari. 'My motives, as ever, are entirely transparent.'
> Hughnon reflected that 'entirely transparent' meant either that you could see right through them or that you couldn't see them at all.

Much like the phrase ‘entirely transparent’ used by Anhk-Morpork’s Patrician, Lord Vetinari, can have two meanings, so too can “Light touch regulation”, and in both there’s a commonly accepted publically acceptable reading, and a less acceptable literal view.

The commonly accepted view of ‘light touch regulation’ is meant to convey that only minute levels of regulation are needed to keep things in order. That gentle nudging is all that’s needed to keep things on the straight and narrow.

The reality, as shown, is that ISPs rarely act in the public interest, and generally have contempt for the FCC (as evidenced by their lies and refusal to adhere to rulings).

In this instance then, the term ‘light touch regulation’ is perhaps more accurately portrayed as an ineffectual tap on the flanks of a behemoth that is easily ignored. A light touch does little to alter the direction of a juggernaut that has made its mind up on a direction. You wouldn’t divert a bull about to gore someone by lightly rapping it on the flank with a pen.

Light touch regulation would be nothing more than ineffectual token efforts that would have zero impact on major ISPs. Now, on small, fledgling or startup companies, they would have a more substantial impact.

So light touch regulation doesn’t encourage competition, it will actively stifle it by being meaningless to major players, while stifling startups and minor players.

There is a parallel to US electoral law. The US claims to be the ‘land of democracy’ and similar, but I’ve spent 20 years now working in political actions around the world, including forming parties. Most US states have amongst the strictest laws for establishing and then staying

17The Truth, by Sir Terry Pratchett. ISBN 0-385-60102-6 Published 2000

established as a political party in the world. In addition, most states have two sets of rules, one for 'major parties' (Democratic and Republican) and another for everyone else, which is overly onerous. The aim is to discourage newcomers. Even the write-in-rules for presidential elections (that's for a single candidate to a single office) covers 63 pages[18]. This is the result of 'light touch' central regulations, leading to a mess of local favoured regulations and local rules which favour incumbents.

In short, 'light touch regulation' does exactly the opposite of Chairman Pai's stated aim, and that has been backed up by decades of study and observation following deregulation and reduced regulation.

Competition

The main reason to be 'for' Net Neutrality is for Competition and innovation. There is a key distinction between infrastructure and services. The idea behind Net Neutrality is that it shouldn't matter who my ISP is, I should be able to access the same content the exact same way. In effect, the ISP is nothing more than a 'dumb pipe' much as my natural gas infrastructure is a dumb pipe. I can then choose my own services to use over that pipe that fits my needs. This is the basis of competition.

Major ISPs do not like being considered a 'dumb pipe', because it's an impact to their profitability. As a dumb pipe you can only charge for the services of being a pipe. Any other services that may be offered are entirely separate and have to compete on their own merits against others, as they should in a free market.
For example, let's take Video streaming services. Both Comcast and AT&T (just as examples) offer their own Video-on-Demand(VOD)/Streaming services, but there are independent services that compete with them, such as Netflix, Youtube, and Hulu obviously, but there are other smaller services as well. Net Neutrality means that Comcast's VOD services can't be prioritised over other services available.

Likewise, were I to launch a new video service, without net neutrality, it may not matter how wonderful, innovative, or groundbreaking it is, as the major ISPs could disrupt my ability to get customers, or later prevent existing customers from being able to use my service. Unless I were to pay the ISP handsomely for the privilege of less their users have access to my service.

It would be the same story with a VOIP system (and as noted above, this has happened with some ISPs and VOIP/VideoVOIP) or indeed any other service. It essentially permits the ISP to extort any service by saying 'gee that's a nice service you got there ,shame if something happened to our users ability to access it'. Then it becomes a bidding war, one which only incumbents can afford to win.

18http://ktetch.co.uk/2016/10/can-you-write-in-for-bernie-or-pence/ includes a reference sheet to the state laws in all 50 states and DC (except Tennesee whose laws I couldn't find) regarding write-in candidates for President and which comes to 63 pages.

Worse, it may then lead to other countries doing the same sorts of things .US companies would have difficulties expanding into other countries when their ISPs refuse to allow access. We've already seen some of this regional segmentation with the likes of Russia and China.

That's why there's no way, without net neutrality to ensure competition and innovation.

Many might claim 'but what about in the old days'. Competition existed prior to the 08 Comcast order, or even the 04 Open Internet Principles. This is true. However, the technological landscape is not the same now as it was then, thanks to Moores Law[19]. Processing power has increased far in excess of the rise of data throughput as well as dropping significantly in cost. $35 Raspberry Pi boards are at an equivilent performance level with desktop computers from 2000 that cost $1000. In the last 10-12 years computer power became both fast and cheap enough to make deep-packet inspection (needed for ISPs to perform net neutrality violations) economically possible.

So it wasn't just the reclassification from Title II to Title I in 2005 that encouraged these violations, it was also that it was economically and technologically unfeasible to do it beforehand. As computing power has increased, and cost decreaased, it's now easier than ever to violate net neutrality, often with off-the-shelf components, whereas prior to 2005 you would need speciality boards custom-designed for the job.

So while we didn't have legislated net neutrality then, we did have de facto net neutrality, because the ability to violate it wasn't technologically available.

19Moores Law basically theorises that computing power doubles every 2 years - https://en.wikipedia.org/wiki/Moore%27s_law

Appendix A

Submission from 2014

3 years ago today, I submitted this consultation response to the previous Proceeding, focusing on reclassification to Title II. Most of it is still as valid now as it was then.

Comment on Protecting and Promoting the Open Internet

Proceeding 14-28

Personal submission of
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July 17 2014

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Introduction

The case of the ‘open internet’, or Net Neutrality (‘NN’) is one of critical importance to not just the millions of users of the internet, but to the entire population of the US, if not the world. As a communications medium, it’s as revolutionary to civilization as the steam engine, or the telegraph line.

Thanks to the internet, whole new industries have been created, new ways of doing things have become ‘normal’ over the last decade or two and now there are few areas of our lives that are not impacted in some way by the internet.

It’s also an incredibly dynamic area. Teenagers now would have great difficulty in just understanding and accepting the technology that was around at the time they were born. In this, there has been more progress and change over the last 20 years, than there is in most fields in a century or more.

However, for this new sphere to continue to grow and flourish, it must not be constrained to the wishes of a few players, who become gatekeepers and king-makers, getting to pick winners and losers.

In this, Network Neutrality is essential. The greatest change, and the greatest risk always comes from the new player, who can take a risk banking on differentiation, rather than an entrenched brand, who has an incentive to keep to the status-quo as much as possible, where there are no threats to their dominance, and risks are known, and minimized.

And so we come to the statist contradiction. In order for there to be change, there needs to be no change to the historical (for a value of history that may only be a decade or two) of position on Net Neutrality.
By contrast, a change in the way the network infrastructure is administered and managed will lead to a dearth of innovation, and a shift in progress out of the US and into a more future-friendly country.

History

I am, in some ways, one of the reasons for this call for comments. In July of 2007, I was made aware of a claim[i] by Rob Toplowski concerning Comcast and BitTorrent. At that time I had just started work as the lead researcher for TorrentFreak.com, a news site, based in the Netherlands that focuses mainly on BitTorrent related news. Over the next few weeks, I contacted Comcast users all over the US, and performed controlled tests which confirmed Mr. Toplowski's claims. We published our findings August 17 2007[ii].

Our reports led the Electronic Frontier Foundation (EFF) and Associated Press to run their own tests, where they confirmed[iii] our findings.

What was newsworthy as much as the throttling of BitTorrent itself was the unintended consequences. Despite the attempts to narrowly target the restrictions, it ended up triggering on actions outside the designed scope, including Lotus notes[iv], which is a significant problem for internet users.

When we pushed for details with Comcast, we found they denied knowledge, despite it being listed in company documents. Eventually they admitted it, after hearings, and set up a token fund to compensate users. Thus, Comcast readily admitted, and acted with foreknowledge that NN was expected, and so actively attempted to hide it. They also understood the public upset and outrage, even paying for people to 'hold seats' at an FCC hearing, to keep others out.

This has led to orders, and court battles of which the FCC is well aware of. Nevertheless, I felt that a brief recap of the initial history was needed, along with highlighting my own experience in the topic.

Protecting and Promoting the Open Internet

Network Management.

Many of those who advocate for a change to the longstanding NN policy do so from a position of 'network management', especially when it comes to popular high bandwidth applications.

One particular example again involves BitTorrent, and is from 2008.

In late 2008, one of the most popular BitTorrent clients, µTorrent, was moving towards a protocol shift, moving from TCP-based communications to UDP. In effect, the client would be performing the jobs that differentiate UDP and TCP itself, and doing so in a way that attempts to keep a domestic internet connection usable for longer.

I had been testing the new protocol, called µTorrent Transport Protocol (or 'µTP') for a number of months, and had found it fast, and efficient. But not everyone was so welcoming to the new protocol.

In an Op-ed piece on UK tech news site The Register, noted network engineer Richard Bennett wrote one thousand words about how this was going to 'destroy the net'[v].

> *"The best way to ensure that µTP doesn't kill the internet is to throttle it at the source, and any law that stands in the way of ISPs exercising that level of management is deadly to the internet. We can thank the uTorrent developers for reminding us of that salient fact."*

Unfortunately for Mr. Bennett his predictions, like almost all that attempt to justify abolishing Net Neutrality, turned out to be as reliable as any other doomsday prediction, and utterly failed to pass.

Yet that doesn't stop him, and others who work for companies that make filtering and prioritization technologies or advocate and 'advise' the FCC[20] and yet half the time he has no clue what he's talking about. A prime example is in a comment on his own site on this from December 3 2009, where he states

> *The most celebrated claim of BitTorrent blocking, at Comcast, wasn't really blocking, it was a quota system that reserved half of the upstream for non-BitTorrent uses.*[vi]

The only problem is that it had been detailed extensively over the previous 18 months that it was indeed the case. As with most positions taken against Network Neutrality, the only time statements can be made is you ignore facts, and reality to present a fabricated reality. His ignorance of the overall situation regarding ISPs and network infrastructures can be summed up in this twitter conversation[vii] with him from earlier this week.

20 His Curriculum Vitae lists numerous occasions of 'advising' the FCC

5½ years on, there's still not been any meltdown. The only thing it does destroy is the Sandvine system used in the earlier Comcast chicanery, since UDP (which is used by µTP instead of TCP) has no RST packets for the Sandvine equipment to spoof.

Of course the underlying problem that led to the development of µTP – network infrastructure that fails to keep pace with the demands of the users – is never addressed. This is a common theme.

This problem - chronically oversold connections – is becoming an increasing problem as internet providers fail to adequately upgrade networks, and put them off. With the reduction in capital costs, by not upgrading, that realizes higher profits. And thanks to those same capital cost boundaries to competition, there is little chance of realistic competition to encourage growth and network expansion.

Network Infrastructure

Some 15-17 years ago, the internet was just getting started as a major force. It was the height of the dotcom bubble, and yet we were mostly using dialup modems with some variant of 56k technology[21], or slower. At roughly 5Kilobytes/second download speed, and 3 up, they were not the speediest of things. 15" CRT monitors running at resolutions of 1024x768 were common and so bandwidth-hungry tools like streaming video was not an option. Network infrastructures could cope easily, and those that had a desire (or need) for higher speeds could pay a premium for that.

I remember observing an install of a T1 (aka DS1) line in November 2001 to the former Nash Bridges studio on Treasure Island Naval Base, in the San Francisco Bay. The 1.54Mbit synchronous connection would be considered pathetically slow today, but was blazingly fast for the time by consumer standards.

Fast forward to now. 100Mbit or faster is available in many areas of the US, with Gigabit connections available to come. However, many areas (including my own) lag behind.

In fact my local internet provider options underline this problem. I currently reside in the Metro Atlanta region, approximately 40-55 miles from three major cities (Atlanta, Athens and Macon) and yet my internet options are extremely limited. They are

- AT&T DSL
- Comcast High Speed Internet
- Hughsnet satellite internet
- Verizon cellular coverage

Out of these, each has issues. Verizon, while it's provided 4G coverage since the start of 2013 in this area, is extremely expensive, and 2 GB of data does not go far.

Hughsnet is similarly an issue. For roughly $50/month, they offer a 10/1 plan, but only 20Gb of data, only half of which can be used outside the period 2am-8am. There is also the common issue (due to the technology) of significant lag, meaning it's not usable for certain tasks.

21 Both USRobotics X2 and Rockwell Lucent's K56Flex technologies came out around Feb 1997. An ITU compromise standard, V.90 came out August 1999.

Comcast does not actually offer service. It's a Comcast "franchise area" that does not offer any sort of account.

AT&T is thus the only internet provider in the area that offers any sort of usable service. And as such they have no incentive to improve services. As a result, since 2007, the service level has not increased at all. Nor has the price decreased. It's been stable at $52 for a 6/0.5 Mbit connection since 2007 (the best package available, and no-longer classified as broadband). In fact things have been made worse, with the imposition of a 150 GB cap[viii].

Even with this slow connection, that's a rather low limit. If we assume a realistic speed limit of 600kbytes/sec down, that's a theoretical maximum of 1.57 Terabytes (or 1500Gigabytes) that the line is capable of just on the downstream. The 50Kbytes/sec of the upstream also counts and be another 131Gbytes.

So the reality is that a connection that has not had its speed improved in 7+years, or had any kind of price cut, instead became less useful 3 years ago with an imposition of a cap which attempts to limit customers to one tenth of the capacity they've previously had. And all the time bandwidth costs have dropped significantly.

This is crucial because generally the next step is invariably to start exempting data from these caps. In AT&T's case, it exempts its own traffic[ix], giving consumers a strong incentive to use that service rather than a competitor, so they won't suffer overage.

Comcast similarly does the same[x] with its video services, and has instituted caps at various times over the past several years.

Such caps all have two things in common. They are a response to chronic overselling of network infrastructure, usually accompanied by a refusal (or at least a significant reluctance) to improve that infrastructure.

Some defend the practice as 'good economics' and liken the practice to that of airlines who often oversell seats on aircraft, to try and ensure they're as full as possible. However, it's usually only a small oversell (10% or so) and if more people turn up than expected and it is overbooked, they have to give everyone what they paid for, and those that can't fit on the flight, they have to compensate on top of the trip they've paid for. ISPs by contrast just keep jamming people into the overhead lockers, stuff people in the toilets and would lay them across the pilot's lap if they could.

They've been covered in this by fine print and though marketing tricks, such as listing speeds as 'up to', rather than giving an accurate description of the product/service they're trying to sell. In no other industry do we allow a product to be priced and sold at a theoretical 'best' rate, irrespective of the actual quality of the product received. In fact in almost every other industry, such behaviors would result in court cases, or other proceedings.

Now, this would be less of an issue if the networks were in a constant state of upgrade, or if the upgrades were done in a coherent manner from the companies own coffers; but that is not the case at all.

It's a common story with broadband providers. They set up a deal with a state and then renege on the deal when it comes time for their end.

Let's take Verizon and New Jersey as an example.

In 1993, New Jersey Bell agreed to a price regulation system that would allow the company to make more money, Verizon New Jersey (Verizon later took over New Jersey Bell) agreed to a program called 'Opportunity New Jersey" which would see their 'territory' set up with a 45Mbps (both upload and download) fiber optic service by 2010. This they failed to do. The specifics of the contract are clearly laid out in the request for comments[xi] put out by the New Jersey Governor's office in January of this year.

> *WHEREAS, on May 6, 1993, in Docket No. T092030358, the Board issued an order approving a plan of alternative regulation ("PAR-1") for Verizon NJ's predecessor New Jersey Bell Telephone Company. PAR-1 included a plan for accelerated deployment of advanced switching and transmission technologies for its network known as Opportunity New Jersey ("ONJ"). The service capability and technology deployments outlined in ONJ were based upon assumptions regarding technology, markets and economic conditions over an extended period of time.*
>
> *WHEREAS, PAR-1 required Verizon NJ to fully deploy broadband service in its service territory by the end of 2010 and provided for the monitoring of Verizon NJ's progress regarding such deployment.*
>
> *WHEREAS, by Order dated August 19, 2003, in Docket No. T001020095, the Board approved a second plan for alternative regulation ("PAR-2") that replaced PAR-1, but left in place the requirements of ONJ established under PAR-1.*
>
> *WHEREAS, on March 12, 2012, the Board served on Verizon NJ an Order to Show Cause directing Verizon NJ to show cause why the Board should not find that it failed to comply with the PAR Orders in providing full broadband capability in its service territory by 2010; and to file an answer to the Order to Show Cause.*

The response was to say that they only needed to provide access to 35 people in a census area, and only if they can't get service any other way (including 4G wireless, or Verizon's own DSL service) and that if they find anyone like that, they've got 9 months (extendable to 15) to wire them up.

Of course, if the agreement was to provide 'at least DSL or 4G service', that would have been the stipulation, and there would have been no need to pay for (or require) a 45Mbps synchronous connection, they could have just said 'give them DSL'.

Meanwhile, they had no problems accepting the funding without restrictions or conditions – an amount estimated at some $15 Billion[xii] over the last 20 years in charges made for this 45Mbps 'opportunity New Jersey rollout, that turned into ''you can have the same crappy service you were getting anyway'.

They're not alone in this, however.

I have already mentioned the poor state of broadband access in the Shady Dale/Monticello Georgia region. What I've not mentioned is that upgrades that were scheduled never came.

In 2007 a lightning strike in Monticello took out a number of connections for people in the area. Modems were fried, and some damaged equipment at the exchange needed replacing. While talking to the repair technician, he informed me that the U-verse service was just being installed in Covington (the local major town, most famous for its film and TV roles including Smokey and the Bandit, Vampire Diaries and American Reunion amongst others[xiii]). I was also told they were going to start expanding it down towards Monticello over the next year.

A few months later I'd moved to Shady Dale, and in the summer of 2008 I had to call out another AT&T technician because of line issues. While he was fixing it, I asked about the upgrades and was told that they'd started, and they had a big bunch of fiber in the offices, ready to install 'this way'.

It's now 2014 and there has been no installation. When I next had need of a technician in 2010, I asked him about it, and he had no knowledge of any u-verse installation, or any plans to do so. In fact, there are no upgrade plans at all for this area, meaning the price and infrastructure is going to stay at the condition when AT&T bought it from BellSouth. Absolutely typical when you look at the press release[xiv] from the merger, with Bellsouth's CEO, Duane Ackerman, give the usual platitudes that end up being lies.

"This was the right time for this merger," said Ackerman. "This combination is good for our employees, our customers and our stockholders."

Well, it wasn't so good for the customers, like me, who are locked in (because of lack of alternatives) to a company that, because of that monopoly, will not cut prices, or increase service to match the common pace in technology. The FCC realizes this, which is why the definition of 'broadband' has increased over time.

This is why AT&T can still charge $50+ per month for what is no-longer considered broadband. After all, what can I do? Move house?

The "Netflix Problem"

This leads on to the Netflix problem, which has become the public face of the Net Neutrality debate. In this area, Over the Air (OTA) broadcast signals are nearly non-existent. In order to get any kind of decent signal on more than one channel, houses here would end up bristling with so many antennas people would

mistake it for an NSA listening post. As we've already established, Comcast doesn't provide service (but has the 'franchise', so no other company will attempt provide service) which leaves two options; satellite TV, or internet broadcasts.

There are many reasons people no-longer want to subscribe to satellite TV, including its weather-dependence, poor service and increasing costs. It's why 'cord cutters' are increasingly common. The problem is that network issues are turning people off. It's one reason people turn to peer-to-peer systems.

Over the 7 years I've been working at TorrentFreak, there's been one trend I've noticed. P2P usage peaks with content that's both highly promoted, and restricted in its availability.

In July 2011, we predicted[xv] that Fox taking their Hulu delay from next-day, to 8 days would increase BitTorrent demand for those shows. So in August we checked and found[xvi] surges of p2p usage, with Master Chef showing a 189% increase of US downloads.

So, when there are issues with Netflix streaming (or even YouTube playback) people have a tendency to shift towards p2p and copyright infringement. In this, increased network capability may lead to a reduction in copyright infringement due to increased ability to access on-demand media.

Yet infrastructure shouldn't be a problem. Over the last 20 years, there have been vast investments in broadband infrastructure, including the aforementioned $15Billion in New Jersey. Indeed, there are estimates[xvii] that some $200Billion has been essentially 'gifted' to the major ISP's for network infrastructure upgrades, which have not been realized.

The American public has paid for a high speed internet infrastructure, the Buick of ISP options even if not the Cadillac, and yet we've ended up with the Yugo.

Potential Censorship

There's also another issue. By abandoning Net Neutrality, and going to a tiered or 'fast lane' system, there becomes a potential for censorship. After having caused Comcast so many issues, you can imagine we're not high on their list of favorite sites. So if there's going to be two 'speeds' of access, you can be sure which side Comcast will put us on.

Now, if we were to pay, the question would be "how much?" (Although it's obvious that as a text-based news site, we wouldn't need it, it's mostly for illustration). The details of the deals Netflix have made with Comcast and Verizon are not publicly available. So any deal we were to make would be doing so blind, and could cost us significantly more than other players.

Then there's the ability to select and impose moral and/or political ideologies through selective bandwidth support. This is already happening to an extent with site blocking in Europe, (such as with The Pirate Bay, and its artist promotion subsidiary, The Promo Bay[xviii]) which ends up reducing the access to free

distribution tools for small artists ,including myself – my first book, No Safe Harbor[xix], I made available in eBook format on The Pirate Bay in multiple formats.

Innovation Hindrance

It ends up becoming another hurdle to innovation. It can also hinder site take-up and 'conversion'. Several case studies[xx], including companies like Wal-Mart, Amazon, and Tagman have shown significant decreases (between 2-10%) in sales for just a second's extra load time.

As a result, paying for 'fast lane' access will end up becoming a standard practice for any and all e-commerce based site. When 'fast lanes' become de rigueur, then the slow lane becomes the exception, and so it's an extra cost for any new business in order to be competitive.

And despite hopes, this paid system, as it is a 'bonus' will only be a short-term fix, if it fixes anything at all.

Over the last 20 years, we've funneled billions of dollars into paying for internet infrastructure that's never been installed. What minimum upgrades that have been performed over that time have been done only by necessity. With the new paid prioritization system, such upgrades can now be attributed to that paid system and the non-paid system are likely to stay on any pre-existing infrastructure. If that isn't good enough, it will be incentive for companies to pay for the fast-lane access.

To imagine that that his 'fast lane' proposal will lead to any increase in infrastructure rollout, upgrades, or modernization would be exposing a wishfullness that underscores a trusting ignorance of the broadband market.

Competitive Mandate.

The biggest problem with the US Broadband infrastructure is the significant lack of competition. When there's no competition, there's no incentive to compete on price, or service. Having a single DSL provider, and a single cable provider, is not a competitive situation. Even taking DSL or Cable and encouraging competition, so there are multiple providers will lead to an increase in backhaul capacity, and a downwards pressure on price, along with an increase in customer service.

In the UK, despite there being a near national cable monopoly, there is significant competition in the DSL-based broadband market, meaning faster speeds and lower prices compared to the US, and that is despite 4G cellular competition being in its infancy (launching only last year, following a Feb 2013 spectrum auction[xxi]).

A lack of competitive options, brought about through actions that often have the appearance of fraud, corruption, incompetence, or corporate welfare, is not in the best interests of the US, its residents, corporations, or its future. The only ones that benefit are the shareholders of the companies maintaining the monopoly positions.

This even extends to lobbying efforts to try and prevent local communities, who are fed up with the entrenched providers, from setting up their own municipal networks. Just this past week an amendment was rammed through spearheaded by Rep Marsha Blackburn[xxii], aimed at preventing municipal broadband, presumably in response to something Chairman Wheeler is proposing[xxiii]. It's puzzling why Rep. Blackburn would feel that need, considering the success in her own state of such projects.

Thankfully, a state law here in Georgia (HB282[xxiv] proposed by the former Operations Manager of Bellsouth, Don Parsons[xxv]) failed, although similar laws have passed in both of the Carolina's.

Companies claim they "can't compete with government", and yet it's clear it is more a case of "don't want to compete with anyone". When Google announced that Austin was to be the next Google Fiber city, it was only a matter of hours before AT&T announced[xxvi] it too would roll out a Gigabit network. It's more than just a coincidence, but an underline highlighting the great lengths the incumbent operators will go to in order to avoid competition and infrastructure upgrades unless absolutely necessary.

Solutions

There are no easy solutions. While it is going to be expected that any such ruling from the FCC will be appealed, there needs to be a significant look at both the past and the future, and not just focus on the 'now'.

In the past, incumbent operators have been unwilling to abide by deals. Much like a small child wanting a treat now in exchange for doing a chore later, once the treat is over, the chore is forgotten. As President Bush once famously said [or at least tried to]

"Fool me once, shame on you, Fool me twice, shame on me"

As a nation we've been fooled once by the promise of infrastructure build-outs if the 'treat' of subsidies, taxes, credits etc. were granted. It has not happened. They understand that it's not an acceptable action all too well, as can be easily demonstrated:

Sign up for service with them. Then after a month's usage, decide to pay them only ¼ of the bill, and see if they'd be happy with that. As is obvious, they wouldn't be, and would terminate the account, and send the bill over to collections.

It's time the same playbook, for the same actions, were used on them.

As a nation, we have paid for a service, but we have not received that service. By their own demonstration, the appropriate action is to terminate the account and send it to collections.

This isn't exactly possible, so there are other alternatives.

The main one is Title II. With the billions we have invested in broadband infrastructure, there is clearly a need and a public use case for it (else why would we have invested so much?). Yet it's clear that the stewardship is poorly managed (as evidenced by the high prices and low speeds). In addition, in some aspects, the companies have no issue with Title II classification, as long as it brings them money. A narrowly tailored Title II classification is thus not only in the public interest, it is in the fiscal interests, and backed by acceptance (at least in some aspects) by the major ISPs.

The ideal solution would be to divest the infrastructure and service sides entirely, separating the aspects of the wiring, from those providing a service over that wiring. This would be a massive step, if anything more complicated than the 'Bell Breakup', but would be the best long-term solution, although how to provide for growth, both upgrades and expansion, is a complex question to answer.

However, there's no doubt that the status quo ante is not an acceptable way forward, and that there is significant evidence that the major broadband ISPs have no respect for any deals or contracts they may have signed. As such, any agreements made **must** include significant penalties, including forfeiture of any

‘treats’ (with interest) **and** punitive sanctions. This should be a no-brainer for any future deals with major telecom interests, but is essential to reiterate, as getting fooled again, means the shame is on us, for being hoodwinked the same way a second time.

Of perhaps greatest concern, however, should be the significant lack of competition in all aspects of broadband and broadband deployment. Broadband is most definitely not an ‘information service’ any longer, but a true telecommunications service. Over the past month alone I’ve used by DSL connection to conduct conference calls with people all over the world, from the UK to Australia. During a period at the start of the month when my cellphone had issues, I used my computer as a backup (via my Google Voice number). So, at the very least, broadband needs to be reclassified as a telecommunications system, and not an ‘information service’.

This will help us look towards the future, and towards something that is good for the country and economy as a whole, rather than for a few shareholders at a few companies, to the net detriment of us all.

Sincerely,

Andrew Norton

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